Specification

Model			CV1000			
Main unit	Type		3-color model	2-color model	Single-color model	Basic model
	Confocal scanning method		Microlens enhanced dual Nipkow disk scanning			
	Scanning speed		1,500～5,000rpm			
	Excitation laser wavelength		405, 488, 561nm	488, 561nm	488nm	488nm
	Bright field imaging		LED transmission			–
	Camera	Type	Back-illuminated EMCCD			Cooled CCD
		Effective no. of pixels	512×512			1344×1024
	XY-stage		High-precision auto X-Y stage Designated resolution: 0.1 μm			
	Z-axis control		Motorized Z-axis control Designated resolution: 0.1 μm			
	Objective lens		【Standard】Dry: 10X 【Option】Up to 5 lenses can be added Dry: 10X, 20X, 40X Oil: 20X, 40X, 60X Water: 60X LWD: 20X, 40X			
	Stage incubator*1		High-precision temperature controllable incubator 【Temperature】Range : 30 – 40℃ (Room temperature +5℃ or higher) Designated resolution : 0.1℃ 【Humidity control】Forced humidification with a water bath unit			–
	CO_2		CO_2 : 5% Gas cylinder : CO_2*2			
	Attachment		Single 35mm dish attachment with stage incubator			Slide glass attachment
	External dimension		W580×D835×H532 mm			
	Weight		93Kg			
Utility box	External dimension		W319×D368×H518 mm			W319×D368×H346 mm
	Weight		16kg			10Kg
Control software			Sets conditions for imaging, camera, time lapse, environments*1, 3D imaging, map view acquisition,multi-color imaging , and multi-point imaging. Functions include image display. Output file type : 16bit TIFF			
Work station			Controller work station, Display			
Operating temperature			15～35℃ (When operating temperature is over 30℃, water cooling of the camera is required.)			
Operating humidity level			20～70% RH (no condensation)			
Power consumption			100～240VAC/50 or 60Hz 1500VAmax			

CellVoyager and CSU are registered trademarks of Yokogawa.

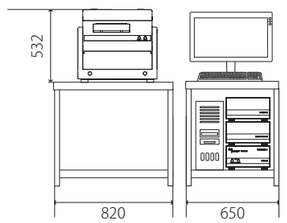
Option

Pinhole change unit	50μm/25μm Switching time : 2sec
Back-illuminated EMCCD	Effective no. of pixels : 1024×1024
Auto focus	Detection of glass surface with laser + offset
Attachment	For Single 35mm dish with Stage incubator *1*3 For Triple 35mm dishes with Stage incubator*3 For Glass chamber with Stage incubator*3 For Microplate For Slide glass *4

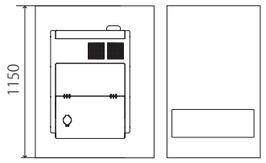
*1 Option (Basic model)
*2 CO_2 gas cylinder not included with CV1000 system
*3 When you use stage incubator, CO_2 mixing unit is required
*4 Option (3-color model,2-color model and single-color model)

Layout

■Front view



■Plain view



・Recommended lab bench size
【Main unit】W820 X D1150 mm or larger
Minimum clearance : front: 160 mm, back: 150 mm,above: 350 mm, side: 120 mm
【Utility box and Controller work station】W650 X D1130 mm or larger
Minimum clearance : front: 50mm, back: 50 mm, side: 50 mm

YOKOGAWA

CLASS 1 LASER PRODUCT
IEC60825-1 : 2007

Safety Precautions
* Read the user's manual carefully in order to use the instrumentcorrectly and safely.
* This product falls under the category of class 1 laser products.

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URL: http://www.yokogawa.com/scanner

Represented by:

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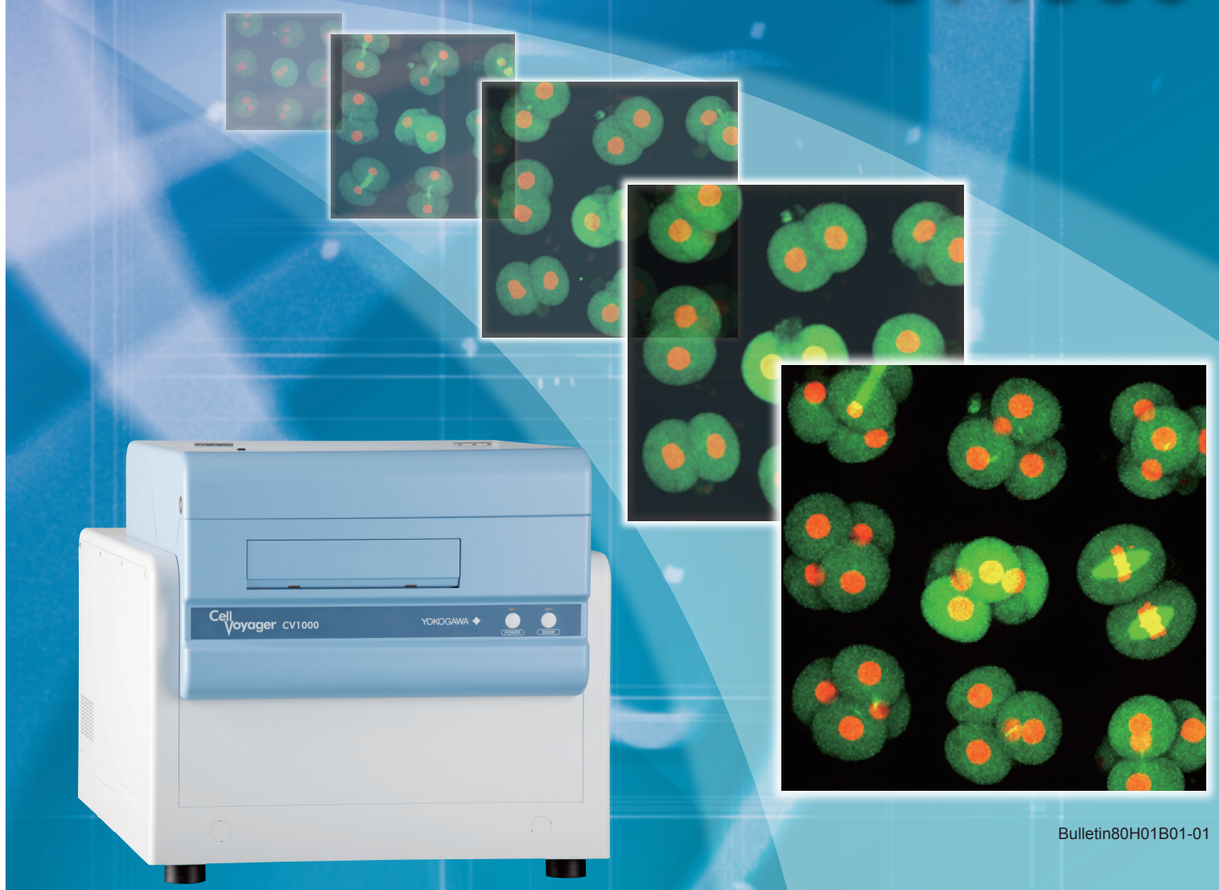
YOKOGAWA

All-in-one live cell imaging solution

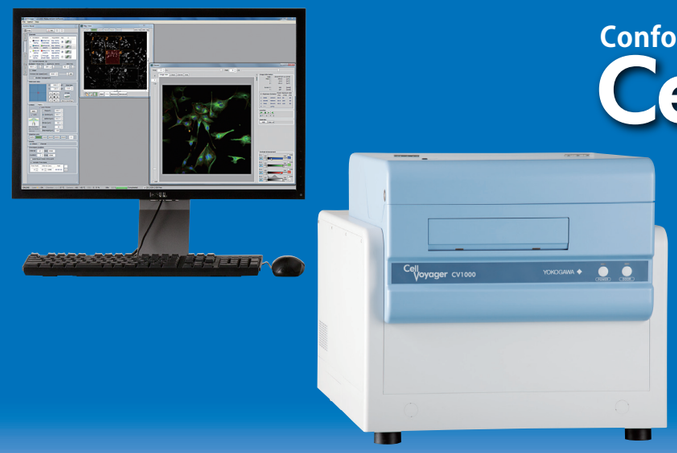
Confocal scanner Box

CellVoyager CV1000



Bulletin80H01B01-01

All-in-one confocal imaging system: The ideal tool for long-term live cell imaging



Confocal Scanner Box

CellVoyager CV1000

The CellVoyager™ CV1000 Confocal Scanner Box is a fully integrated desktop imaging system. With its microlens enhanced dual Nipkow disk scanning technology, phototoxicity and photobleaching are drastically reduced, making it ideal for use in observing highly delicate life processes such as iPS/ES cell generation and embryogenesis. The system is easy to use and eliminates the need for a dark room.

Major advantages

Reduced photo damage ..... CSU (Dual Nipkow disk scanning)
Brighter images ..... Ultra-high sensitivity EMCCD camera*1
Reliable environmental control ..... Stage incubator with high-precision temperature/CO_2 control*1
Precise reproducibility ..... High-precision auto X-Y stage
User friendly ..... Easy-to-use integrated software

Live cell imaging is no longer difficult or complicated – get started right away!

■Want to do long-term time lapse imaging?

The CV1000 is the compact all-in-one confocal system that you can install and get started using right away at your lab bench. It eliminates the need for setting up a microscope, using a dark room, and carefully controlling room temperature.

■Are you having trouble getting the optimal live cell imaging setup?

The CV1000 uses a dual Nipkow disk confocal scanner, the de facto standard tool for live cell imaging that minimizes phototoxicity and photobleaching. The system's incubator keeps delicate embryos, ES/iPS cells,and other types of cells healthy and at a stable temperature for the entire duration of your experiment.

■Do you need to observe different specimen types and lack the time to train users?

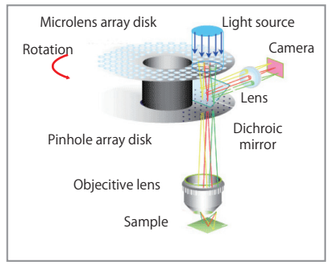
The CV1000 comes with a variety of attachments suitable for applications ranging from high-end multi-point, multi-color time lapse imaging of live cells to single shot high-resolution imaging of fixed specimens.
The software is easy to use – even first time users can quickly master it.
This combination of hardware and software makes the CV1000 the ideal tool for research facilities.

*1 Optional feature on the basic model

《What makes the CV1000 ideal for long-term live cell imaging?》

Microlens enhanced dual Nipkow disk scanning

A Nipkow spinning disk containing about 20,000 pinholes and a second spinning disk containing the same number of microlens to focus excitation laser light into each corresponding pinhole are mechanically fixed with a motor, and very rapidly raster scan the field of view with about 1,000 laser beams when rotated.
Multi-beam scanning with the CSU not only increases scanning speed, but also results in significantly lower photo bleaching and photo toxicity, because multiple excitation needs only a low level of laser power at the specimen to fully excite fluorescence.
More than 2,000 units of the CSU series are used as the de facto standard tool for live cell imaging, worldwide.



《All in one》

Desktop imaging system

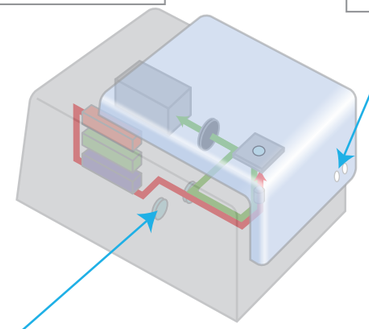
You no longer have to bother with complicated system setup.
Get started right away with confocal live cell imaging!

Compact all-in-one unit

No need for a dark room
– use the CV1000 right at your lab bench.

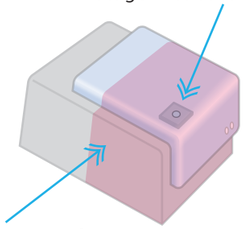
Easy to use

Get started with just the push of a button.
The custom-designed, easy-to-use software does all the hard work for you.



Reliable environmental control

Temperature is precisely controlled inside the stage incubator and measurement unit, keeping cells healthy for long periods.



Double-disk unit with two pinhole sizes*2

Select the optimal pinhole size depending on the magnification.
A direct optical path setting is available for bright field imaging.

《Versatile range of attachments for various specimen types》

Attachments*2

From high-end multi-point, long-term time lapse imaging to single shots of fixed cells

Select the attachment that best meets your requirements.
Use an attachment together with the stage incubator (for 35mm dish, 35mm 3-dish, glass chamber) to keep cells healthy during time lapse imaging.
Attachments for micro-plates with up to 96 wells are available.

35mm dish | 35mm 3-dish | Glass chamber | Slide glass | Micro-plate

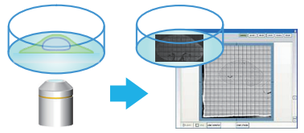
*2 Option

User friendly

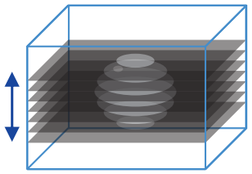
《Easy setting even for complicated multi-point time lapse imaging》 Observation procedure

Insert the sample

Capture a map view image of the entire area (This can take up to one minute) to easily identify the target area

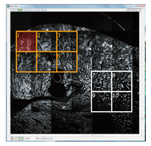


Adjust the z-stroke (focus position)

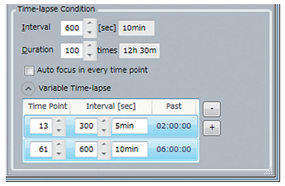


Repeat steps 3 and 4 to set multi-points

Click on the map view area to set the recording area



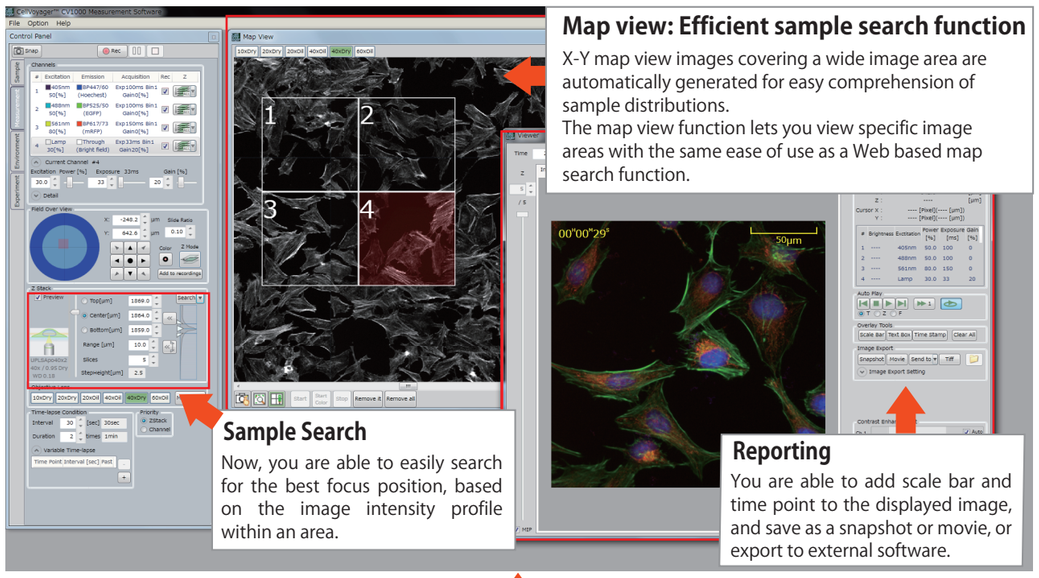
Select the time lapse settings


Time-lapse Condition
Interval 600 [sec] 10min
Duration 100 times 12h 30m
Auto focus in every time point
Variable Time-lapse
Time Point Interval [sec] Past
13 300 5min 02:00:00
61 600 10min 06:00:00

Push the REC button to begin recording!

While recording time lapse images, you can view and compare previously recorded images as well as the current images – a very useful function for long-term time lapse experiments.

《Friendly to both the user and cells!》 Control software



Map view: Efficient sample search function

X-Y map view images covering a wide image area are automatically generated for easy comprehension of sample distributions.
The map view function lets you view specific image areas with the same ease of use as a Web based map search function.

Sample Search

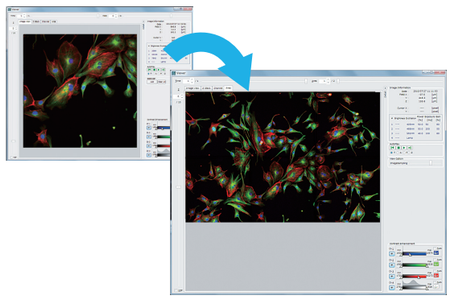
Now, you are able to easily search for the best focus position, based on the image intensity profile within an area.

Reporting

You are able to add scale bar and time point to the displayed image, and save as a snapshot or movie, or export to external software.

Area View/ Well View

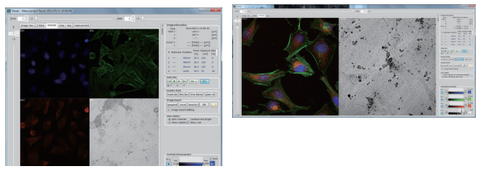
Not only the individual recording fields and areas, it is now possible to view whole imaging areas in a microplate (Well View). The "views" can be recorded as a snapshot or movie.



Field: a single recording field
Area: a group of recording fields, including 1x1 field

Channel Display

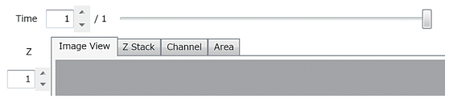
Now, you are able to create merged views of confocal channels, and bright field, and save merged images as a snapshot or movie file.



Channel Merge

Recorded data viewer

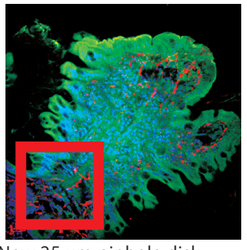
Allows you to easily confirm previously recorded images while capturing time lapse images.



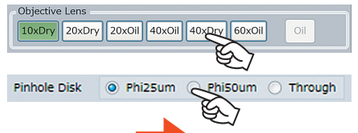
《Easy selection of optimal condition》 Automatic objective lens switching / Double-disk unit*1

Local magnification selection with automatic objective lens switching

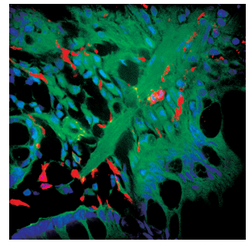
When you select a lens with a higher magnification, the objective lens switches automatically and the image is shown at that magnification.With just one click, you can record a magnified image of whatever region interests you.
With the double-disk unit (optional), you can select the pinhole size that works best with your chosen magnification, for optimal imaging.With a single CV1000 system, you can observe thick and large samples such as a whole mount embryo or an organ slice as well as small and complex samples such as a neurite.



New 25 um pinhole disk (for low magnification) 20X oil



Achieves much higher image quality (resolution and S/N) at both low and high magnification!!



Standard 50 um pinhole disk (for high magnification) 60X oil

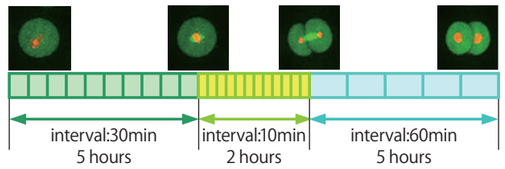
Specimens: Rat small intestine; blue: nuclei, Hoechst 33342; green: golgi, Oregon Green 488; red: actin, Alexa 568

《Capable for complicated setting,too》 Useful functions

Time lapse settings:

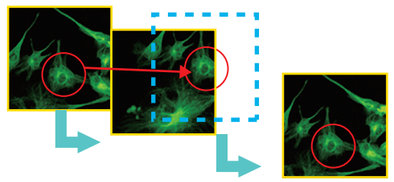
During a time lapse experiment, you can change the settings to allow more precise recording of specific events.

You can set either a single interval or multiple intervals at specific time points.
The intervals and the number of recordings can be changed at any time while time lapse images are being captured.



Correction of imaging area:

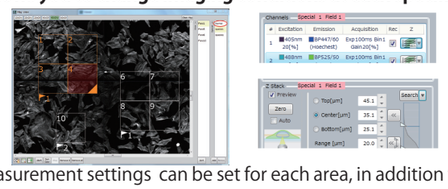
Imaging of moving objects.



You can correct image center of each field during a time-lapse imaging, no more loss of long-term data!

Capable for various condition setting in one experiment:

Allows you to change imaging conditions at each specific area.



Measurement settings can be set for each area, in addition to the focus positions.
You can change such settings during the course of a time lapse imaging.

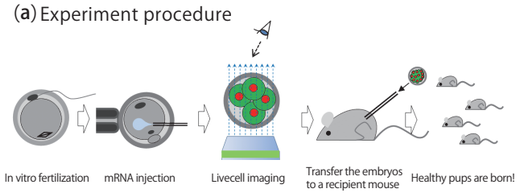
*1 Option

《Developmental biology》 Long-term, 4D time lapse imaging

■Long-term, multi-dimensional imaging of early stage mouse embyos

Following the injection of mouse embryos with mRNA, nearly 25,000 multicolor and multilayer confocal images of the embryos were acquired over 60 hour period as they developed to the blastocysts stage.Thereafter, they were transferred to a recipient mouse that gave birth to healthy pups, each of which developed normally and had full reproductive capability.This is firm evidence that long-term, multi-dimensional confocal imaging with CV1000 causes no harm to a delicate specimen such as an early stage embryo.

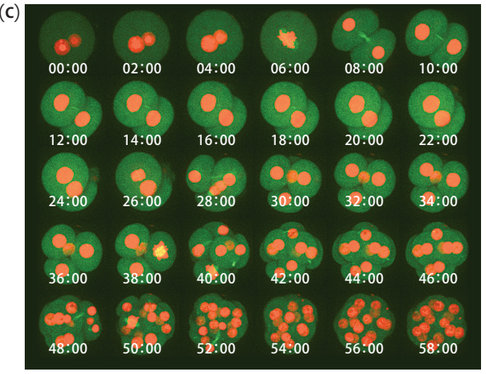
(a) Experiment procedure



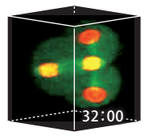
(b) Imaging condition

Total time	60hours (2.5days)
Interval	15min
Z-sections/stack	51sections (2μm apart)
Imaging positions	6fields (72embryos)
Number of total images	146,880 (24,280 images /field)
Excitation	488nm, 561nm
Objective lens	20X oil

(c)



Images extracted at 2hour intervals from 60 hours of data.
Each image is the maximum intensity projection of a total of 51 z-section images.
Green：Spindle (EGFP- α -tubulin)
Red：Nucleus (H2B-mRFP1)



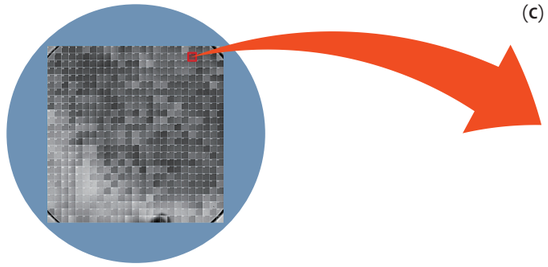
DATA:Kazuo Yamagata, PhD, Wakayama Lab.(Laboratory for Genomic Reprogramming),Center for Developmental Biology, RIKEN

《Developmental biology》 Wide-area imaging of primordial germ cells

■Wide-area imaging of primordial germ cells

The process to form colonies of EG cells(a kind of iPS cell)from primordial germ cells expressing GFP of 12.5 days embryo of TG mouse was imaged for a long-time at the whole area of a culture dish(625fields). As a result of 5 days imaging, colonies of EG cells were formed as frequently as was formed when the cells were cultured in a CO_2 incubator. With he CV1000, you can record whole area quite at ease when you don't know where to find the target, and can discover what happened from the acquired data.

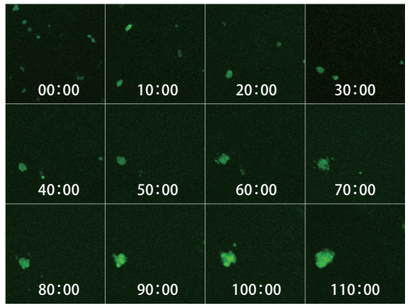
(a)



(b) Imaging condition

Total time	120hours (5days)
Interval	30min
Z-sections/stack	3sections (2μm apart)
Imaging positions	625fields (the whole area of a culture dish)
Number of total images	450,000 (720 images /field)
Excitation	488nm
Objective lens	10X dry

(c)



Images extracted at 10hour intervals from 120 hours of data.
Each image is the maximum intensity projection of a total of 3 z-section images.
Green：Membrane (EGFP)

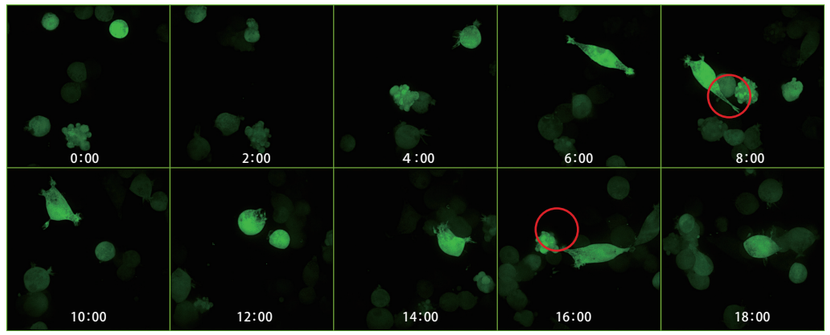
DATA：Yasuhisa Matsui, PhD, Cell Resource Center, Institute of Development, Aging and Cancer, Tohoku University

《Cancer application》 High-speed 4D imaging

■Imaging of 293F cells transfected with eGFP by using NeoFection

Floating 293F cells were transfected with eGFP by using NeoFection, a transfection accelerating agent made by ASTEC.The cells were shake-cultured over night. As a result of time lapse imaging, active movement of cells expressing eGFP inside the floating cell clusters, and structural changes in the cell wall such as ruffing were clearly observed.

(a)



(b) Imaging condition

Total time	20hours
Interval	10min
Z-sections/stack	101sections (0.3μm apart)
Imaging positions	25fields
Number of total images	303,000 (12,120 images /field)
Excitation	488nm
Objective lens	60X oil

Images extracted at 2hour intervals from 20 hours of data.
Each image is the maximum intensity projection of a total of 101 z-section images.
Green：Membrane (EGFP- α -tubulin)

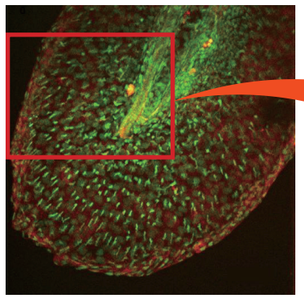
DATA：ASTEC CO,LTD

《Tissue Imaging》 High-speed multi-color imaging

■White blood cells that patrol in zebra fish

White blood cell movement in zebra fish tail was recorded in 2 colors and 3D for up to 3 hours, at 1 min. interval.Thanks to fast Z-motor and laser change by the CV1000, 3D movement of living objects could be recorded with high resolution and multi-color.Biological changes in a fairly thick specimen, such as tissue or living zebra fish can be clearly observed.

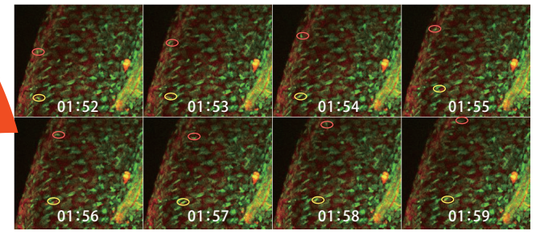
(a)



(b) Imaging condition

Total time	3hours
Interval	1min
Z-sections/stack	20sections (3.2μm apart)
Imaging positions	1field
Number of total images	7,200 images
Excitation	488nm, 561nm
Objective lens	20X oil

(c)



Images extracted at 1minute intervals from 3 hours of data.
Each image is the maximum intensity projection of a total of 20 z-section images.
Green：Nuclei (GFP)
Red：Cytoplasm(mKate2)

DATA：Dr.Philipp Niethammer (Harvard medical school Mitchison Lab)